

## THE GENUS *PAMBORUS* LATREILLE (COLEOPTERA: CARABIDAE) IN THE SLOANE COLLECTION AND ITS IMPORTANCE FOR CURRENT TAXONOMY

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### Abstract

We report on the holdings of *Pamborus* Latreille in the Sloane Collection preserved in the Australian National Insect Collection, Canberra. The collection consists of ten species with 55 individuals. We point out the importance of the collection in current taxonomy and biogeography of the genus. A lectotype is designated for *Pamborus elegans* Sloane.

### Introduction

The genus *Pamborus* Latreille, 1812 is a group of flightless ground beetles endemic to the eastern coastal region from southern New South Wales (NSW) to northern Queensland (Qld) in Australia. Bänninger (1940) was the last to revise this genus, although Darlington (1961) described four additional species in this genus from the subtropical and tropical regions of Qld. As a result, Moore *et al.* (1987) recognized 12 species in the genus *Pamborus*. However, species diversity, phylogenetic relationships and distributional ranges of the genus have not been sufficiently understood and a comprehensive taxonomic revision has been needed. The senior author and his colleagues have attempted to revise this genus by employing novel types of data: genital morphology (internal sac of male intromittent organ) and molecular phylogenetics (mitochondrial and nuclear DNA sequences) (Sota *et al.* 2005, Takami and Sota 2006). Currently, the genus *Pamborus* comprises 16 species, although our revisional studies are continuing.

Thomas Gibson Sloane (1858-1932) was a sheep grazier and entomologist who devoted his life to the taxonomy of Australian Carabidae (ground beetles), including the Cicindelinae (tiger beetles). He later became a world authority on Carabidae (Walsh 1988). After his death, his collection of Australian carabids was donated to the then Commonwealth Council for Scientific and Industrial Research (CSIR) in 1932 and is now preserved in the Australian National Insect Collection (ANIC), Canberra. His collection of carabids was thorough, being described as 'the only extant collection of Australian Caraboidea ever put together by a specialist recognized the world over' (Walsh 1988). However, by the time it was donated to CSIR it had suffered badly due to *Anthrenus* attack, with perhaps only 50% of specimens remaining intact.

In the course of our revisional studies on the genus *Pamborus*, we examined the specimens in the Sloane Collection and obtained important information for the taxonomy of the genus. With respect to the locality data, we discuss the scientific values of the collection for clarifying distributional ranges of the species. Sloane (1915) did not designate a holotype for *P. elegans* Sloane in his original description, which was based on two female specimens regarded as syntypes by Moore *et al.* (1987). A lectotype for the species *P. elegans* (Fig. 1) is designated herein to stabilize the nomenclature (International Code of Zoological Nomenclature (ICZN) article 74).

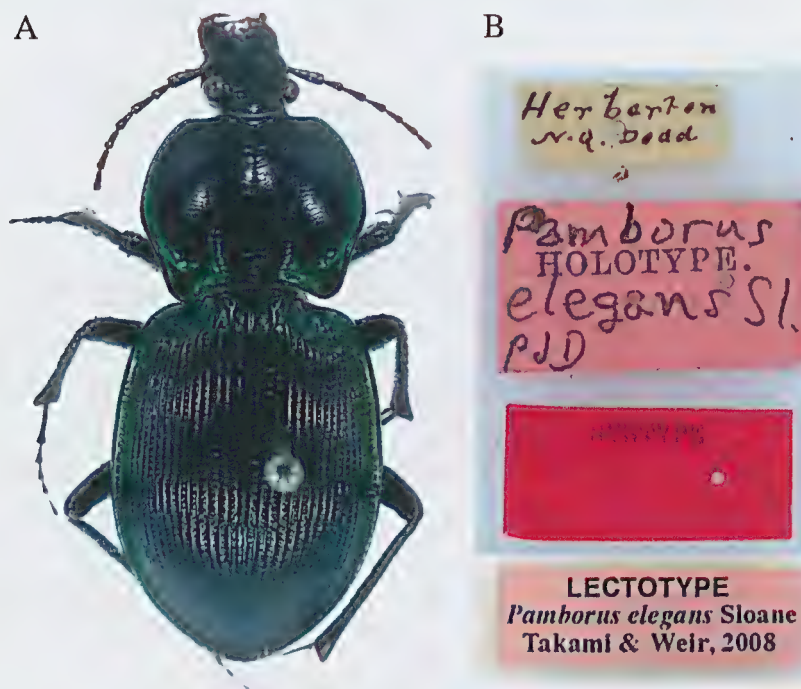


Fig. 1. The lectotype of *Pamborus elegans* Sloane: (A) dorsal habitus; (B) labels attached.

### Materials and methods

When the collection was acquired by CSIR in 1932, some of the specimens were seriously damaged. Specimens damaged beyond recognition were not included in this study. We selected well-preserved, intact specimens from Sloane's original wooden cabinet drawers that are currently stored in steel drawers. We determined these based on external and genital (if available) morphologies in accordance with the current taxonomic system (Moore *et al.*

1987, Takami and Sota 2006). We have attempted to clarify the localities from the labels.

### *Pamborus elegans* Sloane

(Fig. 1)

*Pamborus elegans* Sloane, 1915: 438-439. Type locality: 'Herberton District, southward from Atherton, Queensland'.

*Pamborus elegans*: Bänninger, 1940: 204; Darlington, 1961: 2, 5-6; Moore *et al.*, 1987: 63.

*Material examined.* Lectotype ♀ (here designated) of *P. elegans* Sloane: labelled 'Herberton N.Q. Dodd', 'HOLOTYPE. *Pamborus elegans* Sl. PJD', 'SYNTYPE', and 'LECTOTYPE *Pamborus elegans* Sloane Takami & Weir, 2008', in ANIC.

*Comments.* Although this specimen was labelled as 'HOLOTYPE' by Darlington (PJD, above), there has been no designation of holotype or lectotype in Sloane (1915) or Darlington (1961). Since Sloane (1915) described this species based on two female syntypes, the other syntype becomes a paralectotype on the present designation of the lectotype, even though it was not found in the collection.

### Results and discussion

The genus *Pamborus* in the Sloane Collection consists of 10 species with 55 individuals in total (Table 1). This covers 10 of the 16 currently known species (Moore *et al.* 1987, Takami and Sota 2006). Six of the eight species known to Sloane (at the first third of the 20th century) are involved: *P. alternans* Latreille, 1812, *P. guerinii* Gory, 1831, *P. macleayi* Laporte, 1867, *P. brisbanensis* Laporte, 1867, *P. pradierei* Chaudoir, 1869, and *P. elegans* Sloane, 1915 (Table 1). The two species not present (*P. viridis* Gory, 1836 and *P. opacus* Géhin, 1885) are either rare or taxonomically problematic (only the type is known) respectively (Takami and Sota 2006; see below about the identity of *P. viridis*).

Although the total number of individuals is small, specimens are from a wide distributional range (Fig. 2). This reflects Sloane's enthusiasm for collecting and studying this group of beetles, which resulted in his revisional study on the genus (Sloane 1905) and the description of *P. elegans* from Herberton on the Atherton Tableland, northern Qld (Sloane 1915). Since *P. elegans* has never been collected from the type locality after his record (Bänninger 1940, Darlington 1961), the specimen in his collection (lectotype, present designation) is quite important for clarifying the distributional range of this species. The label of the lectotype of *P. elegans* (Fig. 1B) shows that it was collected by Frederick Parkhurst Dodd. As pointed out by Monteith (1991), Dodd's own account of his collecting trip in 1910-1911 (Dodd 1911) shows that his 'Herberton' material was collected in the moist forests on the Evelyn Tableland, 15 km SSE of the dry locality of Herberton. Dodd mentioned taking 'a handsome *Pamborus*', which probably refers to *P. elegans*.

**Table 1.** List of identifiable *Pamborus* species from Sloane Collection incorporated into the Australian National Insect Collection, CSIRO, Canberra (ANIC).

Species [total number of specimens]	Locality	Number
<i>Pamborus alternans</i> Latreille, 1812 [18]	Bellinger River, NSW	1
	Burrawang, NSW	2
	Eccleston, NSW	3
	Ourimbah, NSW	1
	Bunya Mts, Qld	2
	Goodna, Qld	1
	Mt Tamborine, Qld	4
	locality unclear	3
	without locality	1
<i>Pamborus brisbanensis</i> Laporte, 1867 [1]	Byfield, Qld	1
<i>Pamborus elegans</i> Sloane, 1905 [1]	Herberton, Qld <sup>1</sup>	1
<i>Pamborus guerinii</i> Gory, 1831 [13]	Acacia Creek, NSW	1
	Bellingen, NSW	1
	Clarence River, NSW	1
	Dorrigo, NSW	4
	NSW/Qld	1
	Qld	2
	locality unclear	1
	without locality	2
<i>Pamborus macleayi</i> Laporte, 1867 [5]	Clarence River, NSW <sup>2</sup>	2
	Richmond River, NSW	2
	locality unclear	1
<i>Pamborus monteithi</i> Takami & Sota, 2006 [1]	Burnett River, Qld	1
<i>Pamborus moorei</i> Takami & Sota, 2006 [4]	Guyra, NSW	1
	Orange, NSW	1
	Dalveen, Qld	2
<i>Pamborus pradierii</i> Chaudoir, 1869 [5]	Dorrigo, NSW	3
	Eccleston, NSW	1
	without locality	1
<i>Pamborus subtropicus</i> Darlington, 1961 [4]	Acacia Creek, NSW	1
	Rockhampton, Qld	1
	Yeppoon, Qld	1
	locality unclear	1
<i>Pamborus tropicus</i> Darlington, 1961 [3]	Kuranda, Qld	3

<sup>1</sup> Lectotype, present designation; <sup>2</sup> type locality.



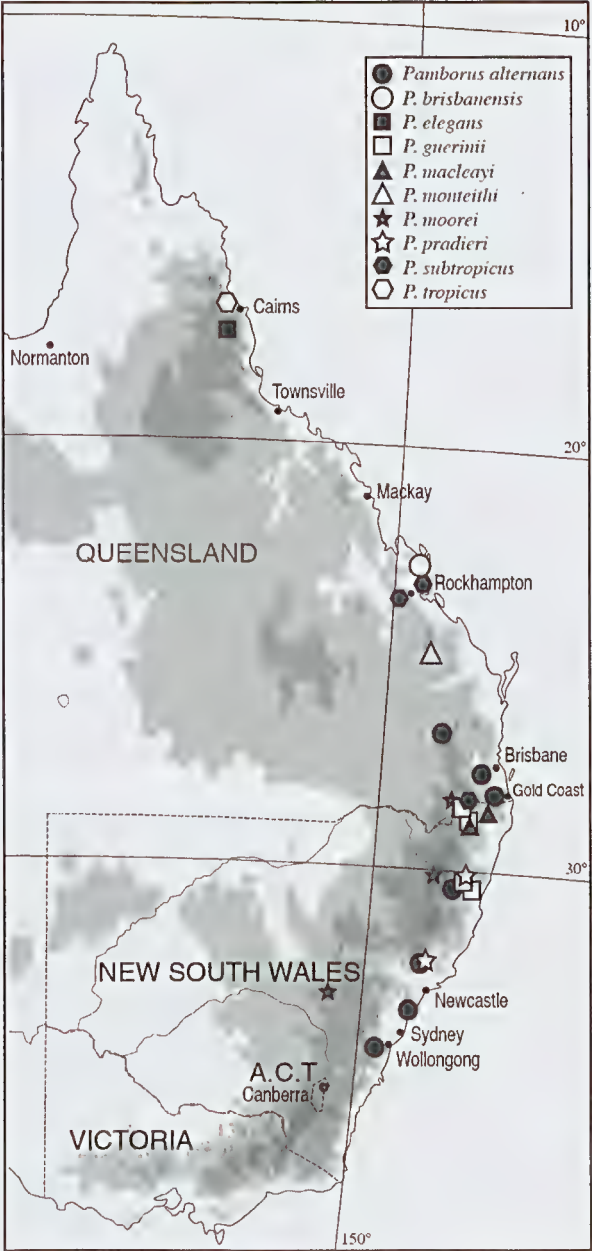


Fig. 2. Localities of *Pamborus* specimens in the Sloane Collection.

The Sloane collection contains four species that were undescribed at that time: *P. subtropicus* Darlington, 1961, *P. tropicus* Darlington, 1961, *P. moorei* Takami & Sota, 2006 and *P. monteithi* Takami & Sota, 2006 (Table 1). Sloane did not describe these species (Sloane 1905, 1915), probably because they are difficult to recognize on the basis of their external morphologies. These species have been confused with *P. viridis* or its related species because they all share greenish elytra with the costae almost continuous to the apex. They were recognized only very recently using male genital morphology and/or DNA sequence data (Sota *et al.* 2005, Takami and Sota 2006).

We could not find *P. opacus* in the collection, although it was listed by Sloane (1905) (but this may be *P. euopacus* with respect to its locality presented in the literature; see also Takami and Sota 2006). The specimen(s) of this species might be lost due to damage and, unfortunately, we could not obtain any information from the broken parts of the beetles.

Of the four 'undescribed' species collected by Sloane, *P. moorei* was recently described from Wollomombi, NSW and was assumed to be widespread in northern NSW (Takami and Sota 2006). This idea is supported by Sloane's locality data for this species in the collection (Table 1, Fig. 2): from Orange, NSW to the border area between NSW and Qld. Recently, we also confirmed this distribution pattern based on an examination of specimens of *P. moorei* in the Queensland Museum (Takami and Monteith, unpublished data). '*Pamborus viridis*' presented in the list of Sloane (1905) may correspond to *P. moorei*, because these two species have been confused until recently (Takami and Sota 2006) and we could not find true *P. viridis* in the collection.

*Pamborus monteithi* is another 'undescribed' species found in the Sloane Collection, which has been known only from Kroombit Tops, Qld (Monteith 1986, Takami and Sota 2006, Takami and Monteith, unpublished data). This species is conspicuous in its large size, brilliant colour and strongly hooked apex of the aedeagus (Takami and Sota 2006). The single male specimen in the collection is labelled from Burnett River, Qld, which is a new distribution record for this species (Table 1). Although detailed locality of collection is unclear, it may be an upper region of this river system, some tributaries of which reach to the southern foot of Kroombit Tops. Thus, the specimen of *P. monteithi* in the collection revealed that this species might have a wider distributional range than known previously.

The present list of the genus *Pamborus* in the Sloane Collection indicates not only its historical value, but also its importance in the taxonomy of the genus as discussed above. Data from historical collecting localities are quite important especially in flightless insects with low dispersal ability, which are likely to show conspicuous geographical variation and local extinction, possibly due to recent anthropological disturbance. The Sloane Collection

allows us to turn our thoughts to a century ago and helps current entomologists better understand the diversity of this group.

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